

Phi Beta Kappa  
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# **PHI BETA KAPPA**

**Addresses delivered at the University of Florida**

## **On the Foundations of Peace**

*by*

**PRINCE HUBERTUS LOEWENSTEIN**

April, 1941



## **The University and Conservation**

*by*

**WILLIAM J. K. HARKNESS**

December, 1940

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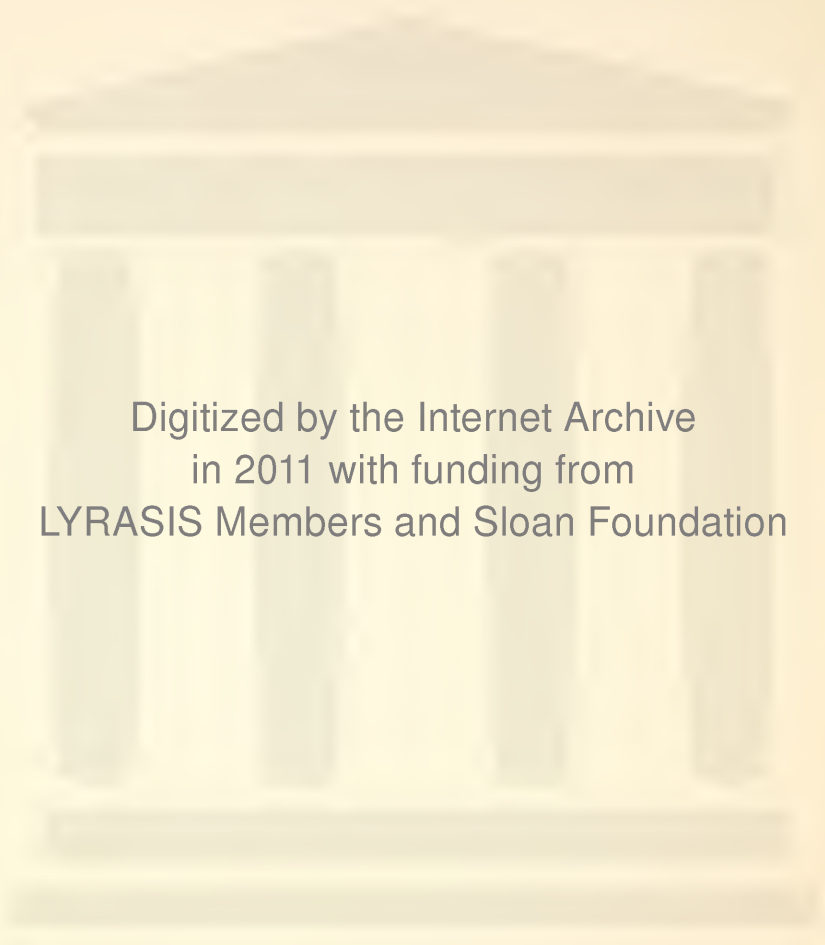
## FOREWORD

The purpose of Phi Beta Kappa is to encourage study of the liberal arts and sciences, and to stimulate a high order of enlightening scholarship in these fields. As a participant in this general program, The University of Florida Chapter, established in 1938, sponsors each year several Phi Beta Kappa addresses as a part of its activities. Certain of these addresses are published. The present issue is No. 3 of the University of Florida  $\Phi$ BK Series.

The first paper, "On the Foundations of Peace", was presented as a public address immediately after the chapter's Spring initiation and banquet, April, 1941. The author is Prince Hubertus Loewenstein. Prince Loewenstein is a member of the distinguished Bavarian family of that name. He received his Doctorate in Jurisprudence from the University of Hamburg. He has been expatriated from Germany, and served at the University of Florida as Visiting Lecturer in International Affairs. For the past several years he has appeared at a number of American universities in this capacity under the auspices of the Carnegie Endowment for International Peace.

The second paper, "The University and Conservation", was presented as a public address immediately after the initiation of  $\Phi$ BK members elected in the first semester, December, 1940. The writer is Prof. William J. K. Harkness. Professor Harkness served as Visiting Professor of Biology at the University of Florida during the year 1940-1941. He is a member of that department at the University of Toronto and is director of the Ontario Fisheries Research Laboratory.

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## ON THE FOUNDATION OF PEACE

PRINCE HUBERTUS LOEWENSTEIN

It has always been the most noble duty of academic institutions to keep alive the flame of intellectual liberty and tolerance, as well as to help preserve for the future the foundations of the supernational community of scholars and ideas, upon which human civilization is based. The maintenance of the scholarly ideal is particularly imperative in times like ours, which have brought so many grave dangers to everything we cherish, and which have had so bewildering an influence even upon sober and clear thinking minds. The confusion has gone so far, that in certain parts of the world the languages of Goethe and Kant, of Racine and Descartes, and great systems of philosophy and immortal works of music are suffering at the hands of the mentally immature and the ill-advised. In other regions, meanwhile, the works of Anglo-Saxon geniuses may be stricken by a similar fate, or the tongue in which Dante wrote his song of Heaven and Hell may find itself placed on the Index of forbidden political literature.

So great, in fact, is the darkness which has descended upon many, that statesmen and politicians, educators and propagandists, nowadays remain almost unchallenged when they undertake to deny retroactively the contributions made by some nations toward our common heritage. Some of these detractors, who have spread the most absurd falsehoods, seem to act in good faith—if good faith can be pleaded in the face of such great ignorance. I have seen publications in this vein by men who certainly know better, and I should not be surprised if the near future might bring an ever increasing amount of such propaganda. The damage which is caused in a period of hysteria, when every distortion of the truth is considered a legitimate weapon, can sometimes not be repaired in many years to come. The chances of a future peace are also impaired, even before peace has come.

The fact that I am calling upon American academic youth to remain clear-sighted and objective in the midst of the present turmoil does not imply that my experiences in American colleges and universities have not been most happy indeed. In almost every section of the country it could be noticed how well American youth has defended the bitterly assaulted domain of reason, and how well it has resisted the temptation to surrender its individual judgment to collective emotionalism.

Providence aims at an ever more perfect development of reason through the dialectical progress of human society. This inner meaning of world history has been recognized and so well described since the days of St. Augustine, and in modern times once more by the Hegelian analysis of the philosophy of history, that it does not require any further evidence. We can rest assured that world history is indeed world judgment, and we need not be too much afraid as to the ultimate future of mankind.

It goes without saying that our faith in the providential guidance of this dialectical progress must not induce us to adopt a quietistic attitude; for it is through us, and through the means at the disposal of the human mind, that reason and freedom become effective in every generation. In order to prepare ourselves for the task which faces us, the living, we should bring before our minds the basic unity of human culture and its super-national origin. We will then understand better the specific duties laid upon

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each nation and what it may contribute in its own way towards the final synthesis of peace and freedom—a synthesis composed of the many opposing, and yet harmonious forces of the past and the present.

Europe is prior to the European nations. It was Europe which created them, and not they who created Europe. Since Roman Law and Roman Peace had brought unity and welfare to the countries from Egypt to Scotland, from the Pillars of Hercules to the Rhine and Danube, the spirit of occidental universalism has never been extinct. It survived the storms of the great Migration, it lived on in the universal language of the Church, in the study of classic philosophy, and found a new political expression in the restored Empires of Charlemagne and of the Saxon, Frankish, and Suevoian Emperors.

It was this intimate union between the Christian, the classic and the Germanic spirit, which assured the continuity of European culture, and served as a counterforce against the centrifugal tendencies of tribal and princely rivalries.

No other sphere demonstrates this fact more clearly than the academic. In science and learning, Christian Europe has never known the nationalistic principle; and the wideness of its conception has permitted also the spirit of other cultures to fertilize and enrich the minds and schools of the Occident.

The principle of academic freedom was, as is well known, proclaimed as early as 1179 by the Third Lateran Council, while the establishment of the *facultas hic et ubique docendi* in the year 1233 allowed scholars and students to migrate freely from one country to another, and to visit those men and institutions from which they could hope to receive the most perfect guidance, wisdom and inspiration.

This *facultas docendi*, which entitled an approved and qualified teacher to teach everywhere in the Christian world, has remained a living symbol of academic universalism, which knows not of national or racial limitations.

Although in later centuries the original principles of the Christian Commonwealth were severely afflicted by religious discord, by growing nationalism, by the territorial, and therefore anti-universal, ambitions of the Habsburg dynasty, and finally by the doctrine of unlimited state sovereignty, they have seen in our own days a revival and rebirth in the minds and hearts of men. I hold that this is true in spite of the First World War and the chaos at its end, which resulted in continued unrest and in the present conflagration, the outcome of which cannot yet be foreseen. It can, however, be influenced and shaped to a certain extent by the work of our mind and by the general attitude of all men of good will.

Since 1914 the world has not enjoyed one year of real peace; and indeed historians may, perhaps, speak about a second Thirty Years war, interrupted by armistices only. In spite of this, the young generation of Europe was able to make many efforts towards international solidarity. While the statesmen, in particular the three standard bearers of the European Idea, Dr. Gustav Stresemann, Sir Austen Chamberlain and Aristide Briand, sincerely endeavored to find adequate political and economic solutions, a polyglot group of students was filling the corridors of the League of Nations Palace and the lecture rooms of Geneva University. While London and Berlin were still officially not on amicable terms, young Englishmen flocked to Germany, and German was heard once more in the colleges of Oxford and Cambridge. Many bonds of academic brotherhood and of personal friendship were woven at that time, and the work of scholars and



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students was complemented by European Labour; and above all, it was Christianity in many of its prominent, as well as nameless leaders, which used the short years of truce to overcome the consequences of exaggerated nationalism.

Perhaps some will feel that all this has been in vain, since the roar of guns and bombing planes has silenced the voice of Man. Yet I do not think that hope should ever be abandoned! Perhaps gruesome reality has made the dream of peace through justice even greater.

In fact, the longing of all nations—of the common men, not just the intellectual leaders alone—for a stable order of right and freedom has become so intense that, could Democracy offer a concrete solution, it would be a weapon to end the war more efficient than military might; because it would hit Totalitarianism and all other forces of war at their very roots.

For this reason it is indeed a *conditio sine qua non*, not only for an early peace, but for the whole future of Democracy, that the coming order should be planned now; and that peace aims, concrete in form as well as in conception, and practicable in their possible application, should be worked out and publicly endorsed by those powers that command world prestige.

There will be some who feel that talk of peace is premature, while others may argue that enough has been said by styling the coming peace democratic in all its aspects. Meanwhile the very word "democracy" receives new interpretations, and misconceptions of history are springing up everywhere.

"My father hath chastised you with whips, but I still chastise you with scorpions"—this attitude is not entirely uncommon anymore in one of the camps, while on the other hand the Axis Powers are envisaging a so-called new order, which is neither new nor an order.

But perhaps the main reason for the failure to formulate peace aims is that many of those who would be called upon to voice their opinions do not know themselves what they want. They may know what they do not want; but as to a constructive picture of the future, they may feel that their judgment can not be trusted—not even by themselves!

The lack of creative imagination in times of great changes has already once proved disastrous for the future. I am thinking of the Congress of Vienna and its failure to build a truly new order that would not have consisted in a mere negation of the immediate past.

Of course, I am far removed from wanting to compare Napoleon with his modern imitators. Yet there is a striking parallel in time and circumstances, and this may become even clearer in the near future.

"Thank God, that we are free again,  
The tyrant is on St. Helene.  
But while the one was overthrow'n,  
One hundred tyrants fast have grown——"

says Wolfgang von Goethe about the period of reaction which followed on the evening of Waterloo.

According to the idealistic interpretation of history, no event, not even the most

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wicked one, is without meaning for the development of mankind, to which the event contributes either directly or dialectically. We know also, that all epochs have to a certain degree been produced by the preceding ones, and that a reactionary re-adjustment of the world would put the hands of the clock back, to a point from where the wicked period would start all over again. Thus it would be a grave mistake simply to reverse the present system of foreign domination in Europe, or to revert to the Treaty of Versailles—if not to a harsher one, as some advocate. In general it might be said that no peace treaty that wants to be lasting must be based upon military and strategic considerations or guided by the key-note “to make the recurrence of aggression impossible”. Discrimination thus introduced would always create resentment and the desire to break these restrictions, and be it only for the reason of national pride to be redeemed from the burden of outside interference. While, for instance, a universal limitation of armaments, and finally their reduction to the level of an international police force is imperative, any such limitation, if imposed upon one nation alone, or any group of nations, is bound to produce again what Versailles produced after the first war.

To outlaw airplanes and ships of certain types, let us say, in one country, or to place civil aviation and seaborne trade under foreign supervision (as advocated by various sources recently) would by no means create the desired effect, for the additional reason, which is most important, that military strategy changes and that the inventive genius of man is never greater than when it must work under severest difficulties. After a number of years, none of such one-sided restrictions would remain, while the bitterness created would serve as a psychological basis for the next war. The unity of Europe can never be made secure by force, but only by eliminating the inter-European national grievances.

The beginning has to be made by learning to distinguish nations from their governments. It would be unjust to blame the French nation as such for the wars of Conquest of Louis XIV and of Napoleon I, or for the dictatorship of Napoleon III, which finally resulted in the Franco-Prussian War of 1870-71. It would be equally wrong to blame the First World War on any particular nation; and in our own days of dictatorships, which assume the most different forms and degrees of hideousness, we should refrain once more from speaking of specific national guilts. Rather should we realize the general guilt of our age, and our sympathy should turn towards those nations on whose soil, because of internal misfortune or outward aggression, totalitarianism has shown itself in its most naked form.

Probably only after the nations of the world have discovered that it is both unworthy and unjust to heap accusations upon each other, will the atmosphere become suitable to a new beginning. It is most surprising, at any rate, that after having accused each other of all possible wickedness and depravation, some nations should still want to have such low and unworthy beings under their sway! Greater tolerance, combined with greater modesty and self-restraint, is also among nations the basis for community existence.

However, before discussing peace more in detail, we should make a remark about the financial and the economic problem. At the same time I have to apologize for dealing with so fundamental a question in so brief a time and in an almost superficial manner.

The economic chaos of the period of international political indebtedness after the first war has proved the absurdity of cash transfers. Any attempt to revive a similar system will, in all necessity, lead toward a similar calamity.

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Therefore, whether or not claims of reparations or repayments are legally justified, we will have to face the problem realistically. Statesmen the world over will have to take the only point of view sound and profitable for future prosperity even though it requires considerable moral courage. The countless billions the nations have spent in recent years, or which they have borrowed from each other, should be written off as the bitter, though not even the most important price our generation had to pay for its own lack of judgment and constructive international policies.

I do not think that any nations will be able to recover anything from each other, as all will be in the same predicament. They should not even try to recover anything, and it might be a well advised policy to face the inevitable with good grace, and to try to find new ways towards economic reconstruction.

Thus, only a general abolition of international political debts and a general renunciation of reparation claims can clear the way for a new beginning, which must aim at the realization of economic unions, or at least at economic cooperation to replace the economic international anarchy of the past.

In this respect, no less than in the field of general political reconstruction, it would seem as if the results of our many mistakes might serve as a lesson for the future. The economic results of the first post-war period, as well as the fruits of the present exaggerated nationalism, with its policy of unfettered sovereignty and its disdain for international obligations, are now seen and felt daily by all the nations. While London's ancient City is going up in flames, Berlin University, the symbol of nineteenth century philosophical and liberal revival is being destroyed; while the people of England go hungry, and see their homes at the mercy of enemy planes, the men and women of Hamburg, Cologne, and Bremen stand before the smoking ruins of monuments of their historic past. There is little or no consolation for either side to know that the destruction wrought upon the other equals or surpasses that suffered by themselves.

We may assume, therefore, that talk of a coming Commonwealth is not as far fetched or utopian as it might first appear. Rather should we believe that we may watch the working of dialectics in the psychological sphere as well; the propaganda of hatred is producing those forces, which will, in due time, defeat their very cause. Consequently, we need not worry too much about what has been called the poisoning of the younger generation that grew up under the influence of such teachings.

Taking these facts, and what we know about the forces of European history into account, we might try to outline the constitution of a Commonwealth, which would be just to its members, and strong enough to assert its controlling and directing influence upon all of them.

The nations, as the historic and cultural units of Europe, should undertake not to infringe upon each other's territories, constitutions, and specific culture. Boundary questions should receive special attention, and in regions of mixed population, free plebiscites should be held. Of course, it would be desirable that smaller national groups combine to higher units, in order to eliminate the danger of too much diversity. In order to protect peace, laws and common interest, and to terminate for ever the period of discord and unsound rivalries, all Christian nations should decide to create a Confederation, which could be called the Commonwealth of Europe. Its French title might be: *Confédération Européenne*, its German: *Das Abendlaendische Reich*, whereby the "Reich" would

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once more receive its inner and original meaning, as the name of a supernational and cultural organism.

It was probably the main weakness of the League of Nations that it did not entirely justify its name, but was rather a league of governments. The founders of the coming peace and its commonwealth should learn from this mistake committed in the construction of the Geneva Institution, and should work out their own plans accordingly. In this future Confederation or Commonwealth, the people of Europe should receive a representation in two Houses, one being elected by the People, without national subdivisions, the other by the nations, in their individual entities.

Apart from a Central Executive Power, responsible to the Central Parliament, and with control over all armed forces, I consider two further institutions essential: one would be a Supreme Court with jurisdiction over the member states, and in particular over those mixed areas where no clear line of national demarcation can be drawn; the other is a Central Council of Labour and Economy.

In order that European economy may overcome the results of war and anarchy, the resources of all nations must be mobilized for the benefit of all. The abolition of tariff barriers, as well as the planning of a continental scheme of production, the regulation of prices, the distribution of goods and raw materials, and foreign trade, should be under the supervision of a central democratic authority.

As the social order of all European countries has undergone the most fundamental changes since the collapse of the feudal system, and as the awareness for the necessity of extending and enlarging the principle of democracy has become the guiding note everywhere, labour and social questions in general require a degree of attention which surpasses the capacity of individual nations.

In the final analysis it will be up to the common men everywhere to safeguard their rights and the peace of their communities against the growth of new anti-democratic, and therefore war-like, groups or tendencies.

While speaking about Europe, I realize very well that a discussion of the coming order must not be limited to one continent alone. Peace has been disturbed everywhere, and any reconstruction will have to embrace all regions of the civilized world.

Yet, the fact remains that Europe, for better or for worse, still is the center of gravitation of world forces. There is a crisis in the Far East only because there is unrest and disorder in Europe. The same applies to the problems of South America, at least as far as the United States is concerned; and it certainly applies to the main questions with which the United States is faced today.

Once Europe has found its proper shape, things everywhere will become less strained, and comparatively easy solutions will be found for all other international and economic problems.

Therefore—and this no longer requires any special emphasis—the Peace of Europe is the Peace of the United States as well, and Europe's future is inseparable from America's. This should mean, too that America would serve its own cause,—apart from serving the moral cause as such—if it contributed towards a solution of a just and lasting nature. In a time when Democracy is in such great peril and when many have lost confidence in its practicability, a solution offered by it would restore its prestige and change the outlook of many millions in all countries.



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I should like to see the creation of an Academy for International Reconstruction, in which the leading minds and experts of America would work in their own fields of knowledge and research, in order to frame a constructive program—the “blue prints” of a peace treaty, acceptable to all. I do not think that there are unsurmountable difficulties to overcome in the co-ordination of their ideas and points of view, once the political, social, and international implications of their tasks have been recognized.

Such work done on American soil—and, without any doubt, it would receive the backing of the people, and of Christianity the world over—might even prove decisive in ending the war, before all remedies may be too late. The fear of important sections of the European people of another Versailles is the strongest weapon in the hands of those who control the machine of Totalitarianism. Let us remove this fear, let us prove that a just and adequate solution is possible, as soon as a non-Totalitarian government assumes power, and the greatest moral as well as political battle of our century will be won. Our hope, however, should not be put once more upon human means, only now should we believe that we may build a new world without changing the old and outlived spirit that is the cause of the international debacle. Did not St. Paul say that no one can lay any other foundation than the one which has been laid by Christ? The evidence for the truth of this statement is so overwhelming, and the failure of all systems, erected on secular principles only, is so manifest, that only the blind and the foolish can disregard the conclusions.

The foundation, which Christ has laid, is the unity of all mankind, and its subjection under the Moral Law, of which He is the Aim and the Beginning. It is therefore not an abstract ethical postulate when we say that all nations are equal, yet that in their own particular way they all contribute toward the same end. It is the recognition of the ever present spirit of the God-Man, who by assuming our nature, and by living according to the laws of this physical world, has endowed it with an importance, a freedom and a dignity of its own.

In the final analysis, any kind of a purely secular, deistic or openly agnostic order is a revolt against the Law of Christ, which is one of Justice, of Individualism, and of Unity. The totalitarian revolt is only the final stage of development, and it would not have been possible without the preceding generations of a de-Christianized, and finally sham-democratic, rather than democratic society.

Our belief in the mission of the brotherhood of scholars and students is deeply connected with these ideas. Though many have not regained yet the metaphysical and spiritual knowledge lost in the last two and half centuries, their life of the Spirit and the very fact of their supernatural standing makes them instruments of peace.

This, and the responsibility it involves, we will bear in mind; we will also remember that in the only alternatives of our age: chaos, which generations may not be able to overcome, or peace achieved by courageous planning and based upon the dignity of Man and of Nations, there are many who fight at our side.

The same longing resounds in the prayers and tears of the mothers in all belligerent countries; in the depths of every created soul glows a spark of the Divine fire, instilled before the beginning of Time, and in every human heart there remains the thirsting for the communion of All in Christ, the Prince and the Foundation of Peace and the Cornerstone of all divine and all earthly edifices.



## THE UNIVERSITY AND CONSERVATION

WILLIAM J. K. HARKNESS

When a biologist is asked to deliver an address he is, unless forcibly restrained, almost certain to speak on that phase of biology in which he has been actively interested. Since no restrictions were placed upon my choice of a subject on this occasion, I shall of course speak to you of biology—not, however, of its philosophic or academic aspects, but rather of the practical applications of this science in the conservation of our wildlife. In the broad sense here intended, the term wildlife includes not only the birds, fish and other animals of a region, but also their natural habitats of stream and lake, forest and field. By conservation of wildlife I mean the greatest possible utilization in perpetuity of these resources by the greatest number of people. At present we fall far short of this ideal. Devastation of the countryside and depletion of the wildlife continue apace; and even though this fact constitutes a major aesthetic and economic calamity it tends to pass unrecognized because of the gradual nature of the change. It is my purpose tonight to show that it is the duty and responsibility of a state university to take an active part in the conservation program—first of all by providing the scientific information upon which any sound program of conservation must be based, and secondarily by cooperation with other state agencies in the development of such a program, with the necessary public support.

As a newcomer to Florida, I have naturally been much interested in the conditions encountered here. The wildlife resources of your state are impressive in their profusion and variety, but one learns from many sources that they are being depleted through over-exploitation. It is the responsibility of the present generation of citizens to arrest this trend, and to place the utilization of these resources on a basis which will insure their replenishment and perpetuation. In saying this, I do not wish to imply that the danger to the wildlife of Florida has hitherto gone unnoticed; there are already a great many people in this state who are interested in the establishment of a well-considered conservation, and in the State Commission of Game and Fresh Water Fish you possess the machinery for carrying out such a program. The difficulty lies very largely in the fact that very little is known about the various important fish, birds, and mammals of Florida, and their relations to their environments—so little, in fact, that it is at present impossible to formulate effective measures for their protection and conservation. It is through carrying out the necessary scientific investigations of your wildlife, and obtaining the data basic to any real solution of your conservation problems, that the University of Florida can make its most important contribution in this field.

How may the University most effectively meet its responsibilities to the state in respect to wildlife conservation? In considering this problem, you may perhaps find helpful suggestions as to what is being done at other universities; and with this in mind I am going to devote a considerable part of my time this evening to a description of a program of biological research which is being carried out under my direction in Ontario by the University of Toronto, and which is in part achieving the desired end. After outlining some of the Ontario research projects as illustrative of possible approaches, I wish to point out the parallel situation in Florida, and to call attention to the great opportunity which the University of Florida has to perform a service to the whole state through undertaking a program of wildlife research.

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Before entering upon a discussion of the biological program of my own research unit, I should perhaps take this opportunity of apologizing for not attempting to live up to the title of this address. The field of conservation as a whole is far too vast for me to attempt to cover it, and it is impossible in one evening even to discuss the problems of wildlife conservation at all adequately. Wildlife is intimately related to and cannot be considered apart from forestry and agriculture. Game birds, mammals, and fish are vitally affected by the pattern of land use, including the distribution of forest and farmland, of urban and agrarian populations, and many other related factors. The forests furnish cover and food for game, conserve moisture, prevent erosion, and ameliorate the climate of a region. Cultivated lands may, when suitably distributed and handled, produce a greater abundance of food available to game than do wild areas, and may thus contribute to an increase in certain forms of wildlife. I could cite many instances in the field of fisheries that demonstrate the influence of forests and of deforestation upon the welfare and abundance of fish in streams. Unfortunately, I shall have to pass over these and many other interesting and important aspects of my subject, and turn to an account of some of the work of the Ontario Fisheries Research Laboratory.

Here I am entering upon the field of my own chief interest—limnology, or the study of lakes and streams and their life, and especially their fish populations. The investigations which I shall describe were not carried out expressly for the purpose of increasing the production of fish in Ontario waters, but began as studies in pure biology. My purpose in presenting an account of this work is to show by example how fundamental biological research on organisms and their environments establishes the basic principles upon which successful conservational practice must be based. I must disclaim credit for much of the work done at this laboratory; the studies are being carried out by senior graduate students and research assistants, and are often planned and executed quite independently of my direction. When any man in the laboratory shows ability to proceed independently he is given all the freedom in research that he may desire.

The relation between the work of this University research unit and the administrative agencies of the Province of Ontario is not by any means a perfect illustration of what might or should be done, nor is the example the best one that I know. The State of New York has maintained a close relationship between research at Cornell University and the practical work of the State Conservation Department; Michigan has still closer coordination between investigative and administrative agencies, the University of Michigan carrying on a continuous program of research in cooperation with the Department of Conservation; and in Ohio a still more nearly ideal condition exists. In this state responsibility for the direction of fisheries research and the administration of the fisheries program of the Division of Conservation is vested in one highly qualified man. It is only because I am most intimately familiar with its work that I confine my remarks largely to the Ontario Fisheries Research Laboratory.

In 1929 the Laboratory began a limnological investigation of Lake Nipissing, a fairly large lake in mid-northern Ontario. Early in this study it was discovered that the lake-herrings found in this body of water presented unusual difficulties of classification. These fish, belonging to the genus *Leucichthys*, are notably plastic and extremely subject to variation; numerous closely related forms have been described, and the same species often shows considerable variation from one lake to another, even when the lakes are adjacent. But here in Lake Nipissing there appeared to be not one, but

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two or three closely allied forms in a single lake. This was a most unusual situation, and one which called for investigation.

Professor J. R. Dymond, assisted by Dr. F. E. J. Fry, began the study of this problem. Examination of samples of fish captured at different times and in different places in the lake showed them to be quite dissimilar, but when a large collection was analyzed there was found to be perfect intergradation throughout the entire population living in the lake, so that the Nipissing lake-herring could evidently not be separated into distinct species or even subspecies. This, although a definite result, merely suggested further questions as to the significance of the observed differences, and Dr. Fry continued to work on the problem in the attempt to unravel this riddle of the Nipissing lake-herring. At this stage in the investigation the problem appeared thus: here, in a single lake, occurred a variable population of fish that could not be separated into distinct species or subspecies, yet the extremes of which were so different that had they been found in separate lakes they would without hesitation have been classified as distinct species or at least subspecies. Here, then, was an opportunity to investigate the factors responsible for producing different forms of the same organism through studies of environment and life-history. This work on the Nipissing lake-herring was expected to furnish a clue to the factors instrumental in causing evolutionary changes in this plastic genus; and let me remark, at this point, that there is no subject in the entire realm of biology more "impractical" or philosophical than evolution. Yet, as we shall see, this investigation ended by furnishing much information of very definite and immediate practical importance.

From the beginning of the study it was evident that temperature relations in the lake had an important influence on the activities of the lake-herring, but just what these activities were was not at all well understood. It was known that fish of the lake-herring, whitefish, trout and salmon groups prefer or require cool to cold water, and in a general way that these fish exhibit a tendency to move into deeper, cooler water as the surface waters of lakes warm during the summer. Starting with these clues a further program of investigation was mapped out. In order to make the results of this work intelligible I shall have to digress briefly at this point to describe the characteristic temperature changes that occur in northern lakes with the progress of the seasons.

Warming of the surface waters, associated with the development of a temperature stratification in the summer, is a characteristic of lakes of the temperate zone. This summer stratification divides the water of a lake into three horizontal layers or strata. The uppermost layer extends from the surface of the lake to a depth of eight to twenty or more feet, and consists of water which has been warmed and which is therefore light in weight. This layer, called the epilimnion, is constantly stirred by the winds during the summer, and in consequence has a high concentration of dissolved oxygen and a low concentration of carbon dioxide throughout. Immediately below the epilimnion occurs the thermocline, a stratum in which there is a rapid decline in temperature with increasing depth. Below the thermocline, and extending to the bottom of the lake, there is a third layer, the hypolimnion, in which the water is cold, practically homothermous, and heavier than that of the overlying layers. Because of its greater density the hypolimnion is hardly stirred up at all during the summer, but remains almost stagnant. If the lake is small the hypolimnion, as the summer progresses, loses its oxygen and becomes highly charged with carbon dioxide, as a result of the activities of the organisms (including



bacteria) which occur there. These organisms, and especially the bacteria, are most numerous on the bottom, and hence de-oxygenation and accumulation of carbon dioxide generally take place from the bottom upward. Throughout the summer there is a progressive warming of the surface stratum, which causes a downward thickening of the epilimnion and a thinning of the thermocline, causing the temperature gradient in the latter to become more abrupt.

Dr. Fry was able to investigate and analyze the movement of the lake-herring from the warming surface layer to the cold water of the epilimnion by means of a net reaching from the surface of the lake to the bottom; the catch at different depths in this net furnished a vertical cross-section of the lake-herring population at intervals throughout the season. Analysis of the catches obtained soon showed that the downward migration and related activities of this fish were not at all simple. In late spring the herring from all parts of the lake began to congregate above the deeper parts. Following this horizontal migration, a descent into the deeper water began to take place, not as a mass migration, but in definite order of size, the larger fish first and the very small fish last of all. The whole movement from the epilimnion to the hypolimnion extended over a period of about six weeks.

Examinations of the stomachs of the fish showed that when they first reach the deep, cold water they stop feeding. It has not been determined whether this fasting period results from the fish having been exposed to temperatures above the optimum for the species during their stay in the epilimnion, or whether it is due to the sudden change in temperature which they experience upon entering the hypolimnion. It is known, however, that there is a direct relation between the earliness of their descent and the length of the fasting period, those fish which enter the hypolimnion first undergoing the shortest fast. The result of this early summer migration of the lake-herring is that the fish become distributed from the top to the bottom of the lake for a time, and are later concentrated in the hypolimnion; and while to the casual observer the population during its migration might appear to be a heterogeneous mixture of size-classes, there is in reality an orderly sorting of the fish. At any given time during the summer the population exhibits a definite arrangement of size-classes and feeding activities from the top to the bottom of the lake, and this distribution is brought about by the different physiological reactions of the various age groups to the changing factors of the physical environment.

Towards fall the surface of the lake begins to cool, and as this cooling continues the fish begin to come again into the shallow water. The return from deep to shallow water is, like the descent, carried out in an orderly fashion according to size groups, but the order of ascent is not exactly the same as the order of descent. In the fall the fish do not have to pass through such an abrupt temperature gradient, and there is no cessation of feeding associated with the fall return to the shallow and now cool water.

At this stage in the investigation, as you will readily appreciate, information had been obtained concerning the activities of the lake herring which was not only of great biological interest, but which would have been of the utmost value in formulating a plan for the management of the species, had this been desired. Actually no direct application of the results was made, since the lake-herring is not a commercial or game fish in Lake Nipissing, and is present in very large numbers. Another result of the study was a better understanding of the characteristics of a lake which make it suitable or unsuitable

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for lake-herring. Among the important factors are those affecting the temperature stratification. Depending as it does upon depth, contour of bottom, and direction of the long axis of the lake with respect to prevailing winds, the stratification naturally differs greatly from lake to lake, and also in the same lake from year to year. When the spring is warm and calm the epilimnion is thin, and the extensive hypolimnion has a low temperature; after cool, windy springs the epilimnion extends much deeper and the temperature of the hypolimnion is not so low. Under some conditions, and in some lakes, the production of carbon dioxide in the hypolimnion is very great, with the highest concentrations near the bottom. Under these conditions the lake-herring, whitefish, trout and salmon are in difficulties. If they go too deep the concentration of carbon dioxide is too great; if they approach the surface the temperature is too high.

We can, therefore, with respect to their suitability for the fish named above, classify lakes on the basis of certain definite characteristics. Lakes with a large amount of deep water afford favorable conditions for the fish all year and every year, and so can maintain large populations of these species. Other lakes, in which the amount of deep water is limited, are likely to present such unfavorable conditions during most years that all of these cold water species are absent. Intermediate between these two extremes are certain lakes with a moderate extent of hypolimnion, in which lake-herring and whitefish may be present, but not trout; during occasional years conditions in lakes of this intermediate class may become so unfavorable that most of the lake-herring die.

In another phase of the investigations on the Nipissing lake-herring it was found that temperature, besides controlling the migrations and behavior of the fish, also plays a very important role in its reproduction and development. During the fall the lake-herring come into the shallow water near shore to spawn. Actual spawning of these fish takes place in response to temperature stimuli, and the time of its occurrence is a function of the resultant of accumulative temperature effects throughout the year and of the specific temperature which starts spawning activity. Since water temperatures, like air temperatures, vary from year to year, the time and conditions under which egg-laying occurs vary considerably.

The eggs, deposited sometime during the fall, hatch in late winter or early spring, and the young lake-herrings begin feeding almost at once on the microscopic water-animals and water-plants that are collectively called plankton. Both the duration of the embryonic period and the time of hatching are determined primarily by water temperature, and this same factor controls the growth and abundance of the planktonic food organisms. In these northern lakes water temperatures through fall, winter and early spring scarcely exceed the range from 2° to 4° C., and it is the slight changes within or just beyond this range that affect the time of spawning, rate of development of the embryos, and time of hatching of the young fish. The rising temperatures and increasing amount of sunshine in early spring bring about a rich development of the planktonic animals and plants, and the hatching of the young lake-herring fry is so adjusted to temperature that it normally coincides with the development of the copious planktonic food supply necessary for their rapid growth.

You will note how, starting from the original inquiry into the significance of the apparent presence of more than one variety of lake-herring in Lake Nipissing, new problems and new lines of study had opened up as the investigation progressed. As a result of the work, knowledge of the life history of the fish, and of the factors affecting



its occurrence, had been materially increased. As yet, however, I have not indicated the solution of the original problem that Dr. Fry set out to study. He found the answer to this during the course of laboratory experiments on the development of the eggs and the rearing of the young. Previous investigators had found that in certain other fishes the number of vertebrae and length and bulk of the head relative to the size of the rest of the body were affected by the environment of the eggs and young fry. The lake-herring was found to vary in a similar way, the effects being produced by the temperature during embryonic development, together with the temperature and food supply of the newly hatched young. Fish from the same batch of eggs, reared under unlike condition of temperature and food, differed so greatly in general appearance when mature that they could easily have been mistaken for distinct species. The variability of the Nipissing lake-herring population, therefore, could be very simply accounted for by the variation in water temperatures and plankton abundance during the winter and spring, from season to season and from one part of the lake to another. This constituted rather direct evidence as to the manner and degree in which environment may mold the form and appearance of a plastic organism such as the lake-herring.

Up to this point I have been describing a purely biological investigation, undertaken without thought of direct application; and you may feel that I have wandered far from the topic of conservation. Yet I have not, in reality; the rest of the story now follows, and will serve to point the moral that the only sound basis for sound administrative practices in the field of conservation is detailed knowledge of the organism to be conserved. My purpose is to make clear the relation which should exist between purely biological research on wildlife, and the administrative application of such research in effective measures for wildlife conservation.

In 1935 the Ontario Forestry Branch invited us to establish our laboratory in Algonquin Provincial Park to carry out an investigation of biological conditions in the lakes of that area. On the basis of our findings we were asked to establish a fish conservation policy which would allow the maximum utilization of the fisheries resources of the park, and at the same time insure their perpetuation.

Algonquin Park has an area of about 2,500 square miles, and contains approximately 2,000 lakes, of which probably more than 700 contain game fish in desirable and catchable size and quantity. Since the Ontario Fisheries Research Laboratory is a division of the Department of Biology of the University of Toronto, there was no desire or intention to turn it into a game management unit. Our program was, on the contrary, to carry on what might be considered pure biological research on the limnology of the park, with special reference to the fish, and then to use the findings of this research in determining conservational principles for the resources in question.

The lakes of Algonquin Park presented no particular difficulties for research in limnology, but the establishment of methods for investigation of the game fish populations did present a very real problem. These game fish—lake trout, speckled trout, black bass, maskinonge and pike perch—although present in many of the lakes in fairly large numbers, were too valuable to be caught by gill nets and removed from the lakes in sufficient numbers to give us the necessary information. In the work on the Lake Nipissing *Leucichthys* such methods could be used, since the fish had little commercial value and were present in such numbers that we could not disturb the biological balance

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of the lake very seriously. But some other means had to be devised for the Algonquin Park studies.

The solution was found in the inauguration of a creel census and by requesting the anglers to cooperate in furnishing the needed information. During the first year the cooperation was not particularly active; a publicity campaign was therefore instituted. Short reports were sent out to many of the anglers, articles were published in the local newspapers, and a few public addresses were made to anglers' associations, explaining what we were endeavoring to do. As soon as anglers realized that we were seeking information that might help to maintain the fisheries their interest was aroused. The cooperation of the public in supplying us with data and specimens has been increasing from year to year as friendly relations with the laboratory and a better understanding of its work have spread to larger and larger groups. On our part, we exert a continuous effort to keep the fishermen informed about our work, plans and progress; and it may be of interest to you to learn that there is as keen an interest shown by those from outside the Province as by the local residents.

We have found that the creel census can be depended upon to supply needed information about the populations of game fish, the trends in the population of catchable fish from year to year, the size of the fish taken, and other pertinent data. In addition to this, with improved organization and increasing public good will, we were enabled to examine, weigh, and measure accurately increasingly large numbers of fish, and from many of them to obtain the stomach contents and sex organs.

Early in the investigation it was a matter of considerable surprise to see, on analysis of the creel census data, that the lake trout were sorting themselves out into size classes according to the time of year at which they were caught, and that the anglers were recording definite changes in the depth at which lake trout were taken as the season progressed from spring to fall. These data were all the more valuable, since many lakes in the area were at the same time being studied with respect to the seasonal changes in their thermal and gaseous concentrations, affording a basis for interpretation of the creel census findings.

The analysis by Dr. Fry of the first year's returns for lake trout showed that they were following the same pattern as the lake-herring—that is, a seasonal movement from warming shallow water to cool deep water, with an accompanying fasting period. This important and characteristic migration would in all probability have eluded detection had it not already been worked out in detail in the case of the lake-herring. Knowledge of this behavior on the part of the lake trout supplied the key for interpretation of the variations in the population of catchable fish at different times of the year, and of the differences in the fishing in different lakes and in the same lakes in different years.

The interpretation of the behavior of the lake trout, based on the first year's creel census, was as follows. In the spring the anglers took fish of all sizes near shore and in shallow water. Somewhat later they could not catch large trout anywhere, the reason being that they had gone to deep water and ceased feeding. Small lake trout continued to be caught for a time in shallow water, but finally these also ceased to appear in records, since they in turn had gone into the hypolimnion and begun their fast. Just about this time the anglers began to take large fish again, but now in deep water; the large fish that went first into the hypolimnion had resumed feeding. For a time these constituted the bulk of the catch; then the smaller fish in the deep water also began to bite. Finally,

towards fall, both the proportion and the actual numbers of large fish caught began to decline. This fact was quite puzzling the first year of the creel census; but when it occurred again in the second year it became evident that it represented an actual diminution in the numbers of these large fish—the first signs of depletion.

This first evidence of depletion may indicate a serious condition, or merely that there had been a surplus of larger fish available for the taking. Which condition exists depends on the situation in the particular lake, and especially on the minimum size of spawning lake trout in that lake. If anglers were catching all fish of spawning size, serious depletion must result; but if some of the spawners were smaller than the smallest trout being taken by anglers, then a stock of spawners would be left to continue the population, though an adverse selection in respect to size might result. Because of the variation in lakes, and in view of the fact that both of these situations do actually occur, it is evident that a separate study of each important fishing lake needs to be made before an intelligent policy for handling it can be worked out.

In some lakes, where conditions for growth are especially favorable the young fish grow so quickly that they reach legal size either before spawning or just as they reach spawning age. We concluded that under such circumstances ample protection would be afforded by closing the lake to fishing in alternate years. This would give the trout an opportunity to spawn at least once and perhaps twice before being caught. It is realized, of course, that anglers do not catch the last catchable fish from any lake; but if they continue year after year to reduce the number of spawners the stock will become so depleted that the lake must be considered "fished out." The closure of a lake under the above conditions not only insures more complete restocking, but also that at least some of the fish caught will be of good size. This was our theory, based upon accumulated biological observations and experiments. Put to the test in Algonquin Park, it produced the anticipated results, and is now a part of standard practice in the Province, where conditions call for such treatment. Not only was the stock of lake trout increased in the lakes where it was tried, but in the alternate open years the crop of fish taken was over twice as large, both in number of fish caught and in total weight of catch, as it had been when the lakes were open for fishing every year.

I should like to mention one other investigation carried out in our laboratory, which illustrates the relation between purely biological research and the application of its results to fisheries problems. Again it involves the thermal stratification of lakes, of which I hope you are not tired of hearing. It was observed that in some lakes in some years the yellow perch formed a large proportion of the food of the lake trout throughout the summer, while in other lakes in which perch were equally abundant the trout did not feed upon them. It should be noted that the perch is a member of a group of species that prefer warm water, while the lake trout is a cold water species. Mr. Robert Martin and Dr. R. R. Langford, interested in the perch as an important trout food, carried out an extensive investigation of all phases of its life history. Shall we call this applied biology, since the investigation was undertaken in view of the economic significance of the forms being studied? They learned that the perch of certain age groups, unlike most warm water fish, descended into fairly deep water so long as it was not too cold. In some lakes and in some seasons the epilimnion is not clearly separated from the thermocline, and under such circumstances the perch will range into the thermocline and approach the hypolimnion. On the other hand, in those lakes and those seasons when there is a distinct and abrupt plane of temperature demarcation between epilimnion



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and thermocline, the perch do not enter the latter zone. When the thermocline is not distinctly set off from the epilimnion, neither is it from the hypolimnion. Under such circumstances the lake trout range up, and the perch down, into the thermocline; the two species are brought into proximity, and the perch serve as forage for the trout. When the lines of temperature demarcation are clearcut there is no such intermingling of the two species, and the perch are not available to the trout as food. These circumstances strongly influence the rate of growth of the lake trout; it grows rapidly in lakes and seasons with poorly delimited thermal zones, and slowly in lakes and seasons in which thermal zones are sharply differentiated. The prospects are far better for creating worthwhile lake trout fishing in a lake of the first than of the second type.

Many instances might be cited in which the temperature and gaseous stratification of water have had a direct bearing upon fisheries management, but I will mention only one almost classical example. On several salmon rivers of the Pacific Coast huge dams have been constructed for power and irrigation purposes. On these rivers the salmon industry, valued at many millions of dollars, was jeopardized by the dams, and immense sums were spent in the construction of elevators and fish ways to take the salmon over the dams so that they might reach their spawning beds in the headwaters of the rivers. Not sufficient thought, however, had been given to the downstream return of their progeny. When the eggs had hatched and the young salmon were headed down the rivers toward the sea, they came to the immense lakes formed by the dams. In these lakes a temperature and gaseous stratification had been set up, and the salmon found in the thermocline a stratum of cool, well-oxygenated water which apparently suited their requirements. Many of them remained in these lakes, becoming land-locked races and adding nothing further to the down-stream salmon fisheries.

The specific requirements of fish in regard to temperature and gaseous concentrations have led to physiological and morphological studies, designed to determine the nature of the structures and physiological mechanisms associated with this specificity. The results of these investigations are almost certain to be of direct value in hatchery practice and other aspects of fish culture. At the present time one of the students of the Ontario laboratory is carrying on such work at the University of Florida Conservation Reserve at Welaka. His research concerns the structural modifications of the heart and circulatory system of various fishes in relation to the physiological demands of specific temperatures and gaseous concentrations, and his study of these features in southern fish as compared with those from northern waters is expected to yield results of much interest.

The value of the program of biological research carried out by the University of Toronto, of which I have outlined only a small part, lies in the fact that it has furnished a secure basis of fundamental information upon which an intelligently planned fisheries conservation program has been set up. Experience has been cogently parallel in New York, Michigan, Ohio and Illinois, and it seems to me perfectly evident that Florida or any other state which wishes to conserve and maintain its inestimably valuable wildlife resources can do so most effectively by establishing a cooperative relationship between the investigative agencies of the University and the administrative and enforcement agencies of the state and federal governments.

And now, as a visitor to Florida with some special knowledge of wildlife conserva-

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tion and a sympathetic interest in your conservational problems, I trust that you will accept the following comments in the helpful spirit in which they are intended.

In the first place, I doubt if most residents of Florida appreciate the richness of their natural endowment, the extent of the wastage that has already occurred, or the depth of their obligation to restore and maintain the wildlife of this state. I do not think there is a sufficiently widespread appreciation of what this resource means in dollars and cents to the incomes of private citizens and the state treasury—an argument which will often strike home when others fail. And lastly, I think that few except my fellow biologists are fully aware of the necessity of fundamental biological research to give the essential information, lack of which has vitiated so much of the older type of conservation work. I shall, therefore, close my remarks by emphasizing certain of these points.

It ought not to be necessary to remind the people of Florida that their state possesses a biota unique in its variety and composition; yet those who live in its midst are likely to forget this fact. To the northern visitor the landscape of Florida is filled with interest and even excitement; the strange vegetation and the abundance of bird and animal life constitute one of the great attractions of the state. The wild lands of Florida are sometimes pointed to as evidence of backwardness and poverty; in reality are they not a source of wealth? For in them lies much of the charm of Florida, for her residents and her visitors alike. In the broadest sense, true conservation must take account of the intangible but very real aesthetic values that man can so easily destroy without intention.

Even were there no other reason for their conservation, the economic value of your wild life resources should alone be sufficient to insure their receiving your most careful consideration. In my own province of Ontario the annual value of the tourist trade amounts to about one hundred million dollars, and it must be considerably greater in Florida. Why do these tourists come to your state? Some doubtless for the races, some for resort society, and some simply to rest in the sun; but a great number come because of the attractiveness of Florida's outdoors, and the opportunities for fishing. The wave of tourists is increasing annually, but what of our wildlife? Are the game animals—the quail and the bass and the deer—and the non-game animals, including such spectacularly beautiful birds as the egrets and ibis—are they holding their own?

We must keep in sight the great significance which the attraction of the outdoors plays in the life of this great nation, quite apart from any direct monetary value as a tourist attraction. The great majority of business men, professional men and administrators, not to speak of others, will tell you that their periods of recreation—days spent on lake or river, or with their dogs in the woods—give them the relaxation that keeps them going from week to week. Within the past ten days two Gainesville doctors have expressed these sentiments to me with respect to their own work and relaxation. We ourselves enjoy these things; we agree that they should be conserved. And yet, it is common knowledge, recognized by the general public as well as by the professional biologist, that in most regions our wildlife is diminishing—in some places almost to the vanishing point. What should we do about it?

Obviously we cannot keep great areas of the country in a wild state. We must consider most carefully what we wish to conserve and what it is possible to conserve. Is



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it herds of buffalo roaming the western plains in place of the wheat fields, flocks of passenger pigeons such as darkened the sky of yore, wolves in such abundance that sheep raising becomes impossible? No; it is none of these. Sad it is that some of these animals have been exterminated, but no one would wish to return to the conditions of primeval America, even were it possible. Cities, good roads and agriculture are here to stay, and no one even desires a country without them. But is it necessary to have, along with the desirable developments of modern civilization, all of the forests cut down to the last twig, with no new forests growing up; the last deer shot, the last bass taken from the lakes, the last alligator made into a purse? This may sound absurd; but it is the present trend, and progress is being made all too rapidly toward this goal.

Opposed to this eventuality is the ideal of conservation, by which I mean, as I stated at the beginning of this talk, the greatest possible utilization of resources by the greatest number of people for a continuous period of time. I have taken the trouble to define conservation because, among the misconceptions and erroneous ideas that have permitted depletion of wildlife to occur there, are many that have themselves gone for a time under the label of conservation. It will be worth while to consider briefly some of the obstacles to the establishment of real conservational policies and programs.

The oldest and most serious misconception was the thoroughly erroneous belief that wildlife resources were inexhaustible. This attitude has now, for the most part, given way to one of great alarm. Certain common agricultural practices work against conservation. Farmers have for the most part not yet learned that a certain percentage of forest area is essential for the maintenance of sufficient moisture for successful farming on the rest of their land, and so in many parts of the country they are still clearing land that never should be cleared, and putting in farm crops. Nor have they in many places learned that much of our land is useless or of little value for agricultural pursuits, whereas the same land, devoted to the growing of timber, pulpwood, or game, may have a very considerable value. To attempt the farming of such lands leads only to sorrow and tragedy, and defeats the purpose of conservation as I have defined it.

Local citizens, not fully aware of the value of the fish and game of their areas as a permanent asset and tourist attraction, often aid the work of depletion by poaching upon these resources, in and out of season; they foolishly believe that as citizens they have certain special rights to local game, of which they are going to make the greatest use before anyone else can have the opportunity of doing so. The sportsmen themselves in part imbued with the idea that wildlife resources are inexhaustible, in part with the belief that what they do not get the next man will, have not yet fully learned that they must exercise restraint if they are to enjoy their hunting or fishing year after year. Added to this is the fact that agents of depletion are becoming more highly organized and efficient year after year—not really organized to destroy, but organized to exploit. Think, for example, of the high-powered rifles, pump and automatic shot-guns, every conceivable kind of fishing tackle, and outboard motors to put on boats that are drawn around the country on trailers to every body of water big enough to have a fish in it.

Not least among the obstacles to the establishment of sound conservational practices are certain ideas and methods formerly widespread among conservation officers and agencies themselves. Early in conservation work it was thought that hatchery-raised and artificially reared stock could maintain and even re-establish resources of game fish, game birds and game mammals. This was a thoroughly wrong idea, and constituted a smoke

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screen behind which was permitted much ruthless destruction of wildlife. It helped to prevent an early start on research in this field of conservation. Another idea, still extant, is that knowledge and practice effective in one area are applicable in any other area where the same game species occur. This belief is just as unfounded as it would be to imagine that the same methods will avail in all parts of Florida for the production of sugar cane or oranges.

The ready phrase of many administrators and protection officers, that "adequate protection is all that is necessary to maintain good stocks of game and commercial species of animals", is on its face ridiculous. For how can a stock of deer be maintained if the forest, their cover, is removed, or if their food is destroyed by fire, or if the population in the absence of predators becomes too large for the available food supply? How can a stock of fish be maintained in lakes or streams poisoned with pollution? And every biologist knows that there are many other and more subtle factors which constitute natural controls and limitations to wildlife, regardless of any protection that may be applied directly. In many instances, in fact, excessive protection becomes detrimental to the welfare of the resource in question.

At this point I may also question an idea often expressed in reports of Conservation Commissions and elsewhere, that "conservation is everyone's business." Truly, everyone should interest himself in seeing that sound conservational principles are being applied in the administration of wildlife resources. But in general, what is everyone's business is no one's business—and that is all too often the case with conservation.

And now, what steps should be taken to bring about the establishment of an adequate conservational policy?

Conservational agencies must be as well equipped and organized as those agencies which are now exploiting the resources with too high a degree of efficiency. The men who are making use of these resources—lumbermen, hunters, anglers and poachers—are successful in their objectives because the tools and practices of their trades are the results of long years of study and experience. The conservationist is starting about a hundred years late. The last salmon disappeared from Lake Ontario about 1887; the last passenger pigeon died in 1913.

What are the tools of the conservationist?

First, a knowledge of the resources to be conserved. If it is a particular species of bird, mammal or fish, its conservation must be undertaken in the light of a thorough understanding of its life history, and of the factors which are favorable and adverse to its welfare.

Second, a favorable and enlightened public opinion with respect to wildlife conservation, and the machinery for creating this opinion, through the public schools and the press.

Third, an administration that is cognizant of the situation, and that recognizes the necessity of exact biological knowledge as a basis for conservation practice.

In the initial stages of a conservational program there should very definitely be close cooperation and coordination between the state administrative agency and those branches of the University concerned with biology, forestry, and agriculture.

The University of Florida holds the key to the success of any program of wildlife conservation in this state, for it has the men trained in the methods and essentials of

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biology, forestry, and agriculture. These sciences must serve as the background for wildlife research at the University, and this research in turn will furnish the information necessary not only for planning and carrying out an intelligently devised wildlife conservation program, but also for the public education which must accompany and furnish support for the program. The University should act as the fact-finding and advisory agency, the State Commission of Game and Fresh Water Fish as the administrative and enforcing agency; the research program should be under the direction of the University, application of its results under the direction and control of the Commission. Only by such division of labor and responsibilities and by such coordination of effort toward the effective accomplishment of the desired result will the people of this state receive full benefits from the funds which they expend for wildlife conservation.

Within the last few years there has been evidence of increasing interest in conservation in Florida. A state-wide Wildlife Federation has been organized, and the State Commission of Game and Fresh Water Fish has been established in response to a demand for greater conservational activity. It is encouraging to take note of this development, and particularly to observe that the University of Florida is itself becoming aware of its responsibilities and opportunities for service in this field. A part of the research program of the University has already been directed toward biological investigation, the results of which will be of direct and immediate value in shaping a conservational policy for Florida.

In the University Conservation Reserve at Welaka, Florida, the University has a well-equipped laboratory and other research facilities, together with a large area along the St. Johns River suitable for fish and game studies. This laboratory can most efficiently serve as a center for wildlife research. In spite of certain handicaps, investigations on quail, bass and other wildlife are already being carried out at this laboratory, and with the cooperation of other state conservation agencies and the federal government the Conservation Reserve should become the focus for a greatly enlarged program of such studies. I understand that a detailed plan for the establishment of such a cooperative wildlife research unit at the University has been prepared with the cooperation of the United States Fish and Wildlife Service, and it is my sincere hope that the people of Florida will support this project in order to reap the enormous benefits which it would eventually bring them.

In conclusion, I wish to emphasize two points most strongly. First, successful conservation of any form of wildlife depends on knowledge of all phases of its life history and relations to environment in the area concerned. Second and last, the University of Florida is the only state agency fitted to carry out the necessary program of research by means of which this basic information must be obtained. Now is the time for the University to shoulder its responsibilities in respect to the formulation of a constructive conservational policy and program for Florida.



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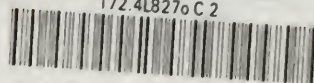
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